

## ABSTRACT OF THE DISCLOSURE

A method for producing a semiconductor device including formation of an interlayer insulating film having a fluorine-doped silicon oxide layer on a substrate. The method comprising the steps of forming the 5 fluorine-doped silicon oxide layer in a process chamber, and forming a silicon oxide layer on the fluorine-doped silicon oxide layer in the same process chamber subsequent to the formation of the fluorine-doped silicon oxide layer. The silicon oxide layer is formed at a temperature higher than a film forming temperature of the fluorine-doped silicon oxide layer thereby 10 forming the interlayer insulating film comprising the fluorine-doped silicon oxide layer and the silicon oxide layer formed thereon on the substrate.